

Predictors of dental care utilization in school children in Al-Madinah, Saudi Arabia

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ABSTRACT

Aim: To explore the factors influencing dental care utilization including sociodemographic characteristics and oral health need in 9-12-year-old school children in Al-Madinah, Saudi Arabia (SA). **Methods:** A stratified random sample was applied to select 10 schools in Al Madinah, SA and a total of 1000 students aged 9-12 years were included in the study. Information on sociodemographic factors, dental care utilization and oral health related quality of life were recorded using the World Health Organization (WHO) questionnaire. A multiple logistic regression model was used. **Results:** Almost a quarter of all participants (23.8%), have never received dental care before. Pain or trouble with teeth was the most common reason for visiting the dentist (49.4%). The percentages of both missing school, and difficulty in eating due to oral health problems, were significantly higher among those who received dental care. Children from low-income families had a reduced likelihood of receiving dental care ($OR=0.571$, $P=0.014$). Children who have caries and who reported having toothache in the past 12 months were more likely to visit the dentist ($OR=1.599$, $P=0.028$) & ($OR=2.188$, $P>0.001$). **Conclusion:** Dental care utilization is mainly driven by symptomatic dental care.

Keywords: dental care utilization, dental care, check-up, caries.

1. INTRODUCTION

Caries remains the most predominant oral disease in childhood despite its decline worldwide (Frencken et al. 2017). Dental care utilization is an essential component for preventing caries and improving oral health and well-being. Understanding the factors affecting utilization has been a topic of focus in dental public health. Several studies have highlighted different reasons of utilization or underutilization among children. Findings suggest that there less dental care use by males, racial minorities, and when lack of accessibility and affordability exist (Chen et al., 2019; Baseer et al., 2020; Tchicaya and Lorentz, 2014). Children whose parents have lower education and awareness and with low socioeconomic status also under utilize dental care (Edelstein and Chinn, 2009; Goettems et al., 2012). Other investigations have identified geographical location and distribution of the dental care services as other important factors associated with the use of dental care (Yuen et al., 2018).

Dental care utilization patterns can also be influenced by the presence of either normative or self-perceived oral health care needs (Piovesan et al., 2011). In addition, dental care related anxiety and fear and reduced quality of life are also important factors that influence the pattern of visiting the dentist; those who have dental anxiety end up avoiding going to the dentist while those who have poor oral health related quality of life visited a dentist with higher frequency (Goettems et al., 2012). Limited data, however, are available on these factors related to dental care utilization in SA. Saudi Arabia has a great burden of dental caries and a low rate of dental care utilization compared to developed (John et al., 2017; Orfali and Aldossary, 2020). In SA, only a small number of children visit the dentist for regular check-ups while the majority go to the dentist only because of pain, despite the free of charge dental services provided by the government (Al Humaid et al., 2018). Data from El Bcheraoui et al., (2016) showed that only 11.5% visited the dentist regularly while Al Agili et al., (2020) reported that one in four children have never visited a dentist. Perceived barriers to dental care for Saudi children who never went to a dentist included oral health illiteracy, dentist-related, financial and transportation (Al Agili and Farsi, 2020), while encouraging factors to utilizing dental care are quality of dental care, reasonable fees for dental services and close location of dental clinics (Al-Husseyen, 2010). Identifying factors related to dental care utilization would help in future public policy making and public health interventions.

This study aimed to investigate the factors associated with dental care utilization including sociodemographic characteristics, and oral health need in 9-12 years old school children in Al-Madinah, SA.

2. MATERIALS AND METHODS

Study design and data collection

Oral health survey data was collected by calibrated and trained staff from the University of Taibah, Department of Preventive Dental Sciences (DPDS) in April 2018 while we conducted this analysis study in February 2021. The survey and oral examinations were carried out in accordance with the international standards established by the World Health Organization (World Health Organization, 2013).

Instructors with previous experience in oral health surveys and examination following WHO's guidelines directed the training. As for the selection of participating schools, a stratified random sampling design was applied to select schools. Schools were stratified based on socioeconomic level of the school district based on the knowledge of the disadvantage of the area; high and low socio-economic. Afterwards, five schools from each stratum were randomly selected and included in the survey. Thus, the stratification of schools was done on area level; however, to carry out the analysis with more specific data, an indication of individual level of socio-economic status was also included based on family data. Both levels included public and private schools.

Prior to each school visit, information sheets and questionnaires were sent to all parents of 9-12-year-olds in the schools to invite participation and obtain consent. All 9-12-year-old students who attended the selected schools on the day of the survey, and whose parents returned the consent form were included in the survey. One thousand two hundred sixty-five students were invited to the survey and the response rate was 83%, so it ended up with 1049 students. Uncompleted questionnaires were excluded from the study, and it ended up with 1000 students. The final number of participants per each school ranged from 98- 119 adding up to 1000. The children were interviewed to obtain sociodemographic data, and information on oral health need and quality of life using the WHO oral health questionnaire for children.

Oral examinations were performed by 10 calibrated and trained examiners following the standardized WHO Oral Health Survey assessment form for oral health surveys (World Health Organization, 2013). Caries experience was measured clinically by the dental examiners and recorded as present if the child had at least one tooth as decayed, filled or was missing due to caries. The interview questionnaire incorporated information on sociodemographic characteristics, utilization of dental care, and child self-perception of oral health.

Study variables

The main outcome of interest in this study was dental care utilization and was measured using a question about the frequency of visiting the dentist within the past 12 months (once, twice, three times, four times or more, or "I have never received dental care"). A new binary outcome variable was created with all those who reported dental visits as one category, and all other responses as a second category (visited the dentist and never visited the dentist). Independent variables comprised of oral health need variables which included caries experience (examined need), self-perception of oral health and toothache in the past 12 months (perceived need). Caries experience was expressed as (yes or no) for children with/without any caries experience.

Self-perception of oral health was measured by asking the child to rate their perception of their oral health (excellent; good; faire; poor; very poor or I don't know) and for analytical purposes, good and fair were merged to good, and poor and very poor

were also merged to poor. Toothache in past 12 months were measured by asking the child how often in the past 12 months "did you have toothache or feel discomfort due to your teeth" (often; occasionally; rarely; never or do not know). Often, occasionally, and rarely were merged to yes, and never be recorded as no. Reduced quality of life due to oral health problems was measured on appearance, smiling, bullying, missing school and eating. For each variable, the child had to choose (yes or no).

Sociodemographic variables included age, gender, school type, and family occupation. Age was categorized as two groups: 9-10 years old and 11-12 years old. The type of school was dichotomized as public or private schools. To determine level of socioeconomic status, parent's occupations were used as a proxy of family monthly income, and divided into three categories, low, medium and high, as described elsewhere (Kassim et al., 2019).

Statistical analysis

Dental care utilization was analyzed across sociodemographic, oral health need and reduced quality of life due to oral health problems. The difference between groups was assessed by using Chi-square and significance levels were set at P value ≤ 0.05 . Logistic regression model was carried out with dental care utilization as the dependent variable and adjusting for sociodemographic characteristics and oral health. Software used for data entry (Microsoft Office Excel 2018 for Windows, Microsoft Corporation, Redmond, WA, USA) and all statistical tests were conducted using IBM SPSS software (ver.25.0; IBM, Chicago, IL, USA).

3. RESULTS

Of 1265 students aged 9-12 years old, a total of 1000 students with completed questionnaires and oral examinations were analyzed and included in the study (83% response rate). Table 1 presents characteristics information for the sample and the distribution of the variables across dental care utilization. More than half of the participants (65.6%) were between 11 – 12 years old. Of the participants, 39.9% were females and 60.1% were male. There was a high prevalence of dental caries experience (85.1%), and 81.4% reported toothache in the past 12 months, however, two third of the participants were satisfied with their oral health; and 62.2 % reported good oral health. Pain or trouble with teeth was the most common reason for visiting the dentist (381 child) while only 139 child visited the dentist for routine check-up (Figure 1).

Table 1 Characteristics information of 9-12-year-old schoolchildren and dental care utilisation in Madinah, SA (n = 1000)

	Total (N) Percentage	
All children	(1000) 100	
Sociodemographic		
Age	9-10	(342) 34.4
	11-12	(653) 65.6
Gender	Male	(601) 60.1
	Female	(399) 39.9
School type	Private	(504) 50.4
	Public	(496) 49.6
Family income	High	(279) 28.4
	Middle	(391) 39.7
	Low	(314) 31.9
Oral health needs		
Caries experience	Yes	(851) 85.1
	No	(149) 14.9
Self-perception of oral health	Excellent	(221) 22.2
	Good	(620) 62.2
	Poor	(103) 10.3
	I don't know	(52) 5.2
Toothache in the past 12 months	Yes	(810) 81.4
	No	(185) 18.6

Dental care utilisation		
Visiting the dentist in the past 12 months	Never	(237) 23.8
	Once	(190) 19.1
	Twice	(206) 20.7
	Three times or more	(255) 25.6
	I don't Know	(109) 10.9
Reasons for visiting the dentist	Pain or trouble with teeth	(381) 49.4
	Treatment/ Follow up	(160) 20.8
	Routine check-up	(91) 11.8
	I don't Know	(139) 18

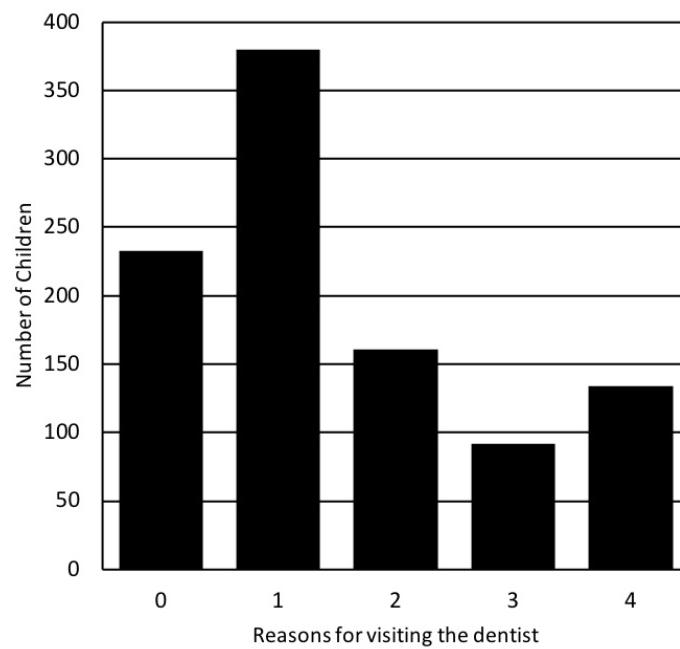


Figure 1 Reasons for visiting the dentist: 0) Never visited a dentist 1) Pain or trouble with teeth 2) Treatment/ Follow up 3) Routine check-up 4) I don't Know

The percentage of children who have never received dental care was 23.8%, and of these, a higher percentage attended public schools in contrast to private schools (27.1% Vs 20.5%; P=0.014) (Table 2). Significantly more children from low-income families had not received dental care (31.5%; P=>0.001). Among oral health need, the percentage of children who received dental care was significantly higher among those who have caries experience and reported toothache in the past 12 months (P=0.027 and P>0.001 respectively). As presented in Table 3, reduced quality of life due to oral health problems was highest in the aspect of feeling embarrassed due to appearance of teeth (49.5%). The percentages of both a): missing school; and b) difficulty in eating due to oral health problems, were significantly higher among those who received dental care (86.3%; P>0.001 and 79.9%; P=0.036 respectively).

The results from the multiple logistic regression models are presented in Table 4. After controlling for all other variables in the model, children from low-income families had a reduced likelihood of receiving dental care relative to children from higher and middle-income families (OR=0.571; 95% CI: 0.365-0.892, P=0.014). Children who have caries were more likely to visit the dentist compared to those who don't have caries OR=1.599; 95% CI: 1.051-2.432, P=0.028), and children who reported having toothache in the past 12 months were more likely to visit the dentist (OR=2.188 95% CI: 1.507-3.178, P>0.001).

Table 2 The distribution of variables across dental care utilisation in Madinah, SA (n = 1000).

Variables	Percentage		P value
	Never Visited the dentist	Visited the dentist	
All children	23.8	76.2	
Sociodemographic			
Age	9-10	24.6	0.652
	11-12	23.3	
Gender	Male	24.1	0.779
	Female	23.3	
School type	Private	20.5	0.014*
	Public	27.1	
Family income	High	21.0	
	Middle	19.4	>0.001*
	Low	31.5	
Oral health needs			
Caries experience	Yes	22.5	0.027*
	No	30.9	
Self-perception of oral health	Excellent	28.2	
	Good	21.3	
	Poor	27.2	0.138
	I don't know	27.5	
Toothache in the past 12 months	Yes	21.1	
	No	36.1	>0.001*

*Statistically significant at P value ≤ 0.05

Table 3 Reduced quality of life due to oral health problems in association with dental care utilization

Reduced quality of life due to oral health problems	Total (N) Percentage	Percentage		P value
		Never Visited the dentist	Visited the dentist	
Appearance	Yes (422) 42.5	23.0	77.0	0.596
	No (573) 57.5	24.4	75.6	
Smiling	Yes (214) 21.7	26.6	73.8	0.361
	No (777) 78.3	23.2	76.8	
Bullying	Yes (141) 14.2	23.4	76.6	0.885
	No (847) 85.8	24.0	76.0	
Missing school	Yes (205) 20.7	13.7	86.3	>0.001*
	No (782) 79.3	26.3	73.7	
Difficulty in eating	Yes (373) 37.8	20.1	79.9	0.036*
	No (612) 62.2	26.0	74.0	

*Statistically significant at P value ≤ 0.05

Table 4 Multivariable logistic regression of the association between dental care utilisation and explanatory variables among 9-12-year-old schoolchildren in Madinah, SA (n = 1000)

Variables		B	Wald	OR (95% CI)	P-value
Age	9-10			1	
	11-12	-0.002	0.009	0.998 (0.701-1.422)	0.992
Gender	Male			1	
	Female	0.172	0.932	1.188 (0.837-1686)	0.334
School type	Private			1	
	Public	-0.162	0.779	0.850 (0.828-0.593)	0.377
Family income	High			1	
	Middle	0.082	0.208	1.086 (0.722-1.633)	0.692
	Low	-0.555	5.927	0.571 (0.365-0.892)	0.014*
Caries experience	No			1	
	Yes	0.469	4.809	1.599 (1.051-2.432)	0.028*
Self-perception of oral health	Excellent			1	
	Good	0.377	4.049	1.459 (1.010 -2.107)	0.044
	Poor	-0.111	0.154	0.895 (0.514-1.558)	0.695
	I don't know	-.053	0.022	1.054 (0.521-2.135)	0.883
Toothache in the past 12 months	No			1	
	Yes	0.783	16.923	2.188 (1.507-3.178)	>0.001*

*Statistically significant at P value ≤ 0.05

4. DISCUSSION

This study was conducted to investigate the factors associated with dental care utilization among 9- to 12-year-old school children in Al-Madinah, SA. The results indicate that the strongest predictors of dental care utilization were family income, having caries, and experiencing toothache. In our study's sample population, 23.8% or nearly a quarter never received dental care in the past. Notably, this result is in agreement with other studies conducted in SA. To elucidate, Al Agili et al. reported that 26% of their study sample in Jeddah, SA never visited the dentist previously (Al Agili and Farsi, 2020). After controlling for other variables, our findings indicated that the greater the oral health need for dental care expressed in having caries or experiencing toothache, the higher the use of dental services amongst children. Our results agree with Al Humaid et al., (2018) who found that significantly higher odds of feeling pain were associated with visiting the dentist. In this study, reduced quality of life due to oral health problems was found to be one of the factors associated with visits to the dentist. This finding supports the work of Goettems et al., (2012) who also found that individuals who had poor oral health-related quality of life visited dentists more frequently.

Among those who visited the dentist previously, a very small percentage of children visited regularly for routine check-ups (11.8%). Meanwhile, majority visited the dentist to address pain or to undergo follow-up. This is in line with other studies conducted in SA (Alayadi et al., 2019; Al Humaid et al., 2018; El Bcheraoui et al., 2016). Symptomatic dental visits seem to determine dental care utilization among Saudi children despite the free access to dental care in the country and the increasing efforts to promote preventive dental care visits among children. This irregular pattern in the use of dental health services contributes to the high prevalence of untreated dental caries in the population, where it persists as the main dental health problem among Saudi children (Al Agili, 2013). Herein, it should be highlighted that the prevalence of dental caries was very high (85.1%). The reasons why children never visited the dentist before could be attributed to several factors, including lack of geographic accessibility. In a study by Gafar et al., (2014) it was reported that far-situated dental services was one of the perceived barriers to dental visits. In addition, one of the common reasons that lead to the avoidance of dental care utilization is dental-related anxiety. Dental anxiety leads to avoidance behavior and is associated with higher caries morbidity and need for oral rehabilitation (Eitner et al., 2006).

Furthermore, parents' education and awareness are important factors that influence dental service use by children (Badri et al., 2014). In a study by Alshammary et al., (2019) 58.3% of the respondents reported that they would take their children to the dentist only if the child is experiencing pain, while only 13% of the parents stated that they take their children to the dentist twice a year. Another study reported that parental dental health illiteracy was the predominant barrier to dental care use among children (Al Agili and Farsi, 2020). The quality of the provision of dental care plays a crucial role in determining its utilization. It could influence

parents' satisfaction which, in turn, could be considered as another perceived barrier to children's utilization of the free dental services provided by the government. The results of a previous study found that parents of children who never visited the dentist or who needed dental care in the past 12 month but could not get it reported problems with the dental health system, which included lack of a dentist or a specialized dentist in the community, difficulty in getting a dental appointment, and long wait times at the clinic (Al Agili and Farsi, 2020).

In addition, the unavailability of dentists, long waiting lists and a perception of low quality of dental care in the government's dental clinics compared with private dental offices were reported as barriers of access to dental services in SA (Alshahrani and Raheel, 2016; Al-Jaber and Da'ar, 2016). It has been well documented that children from a low socioeconomic status tend to have the greatest need for and the lowest access to dental services (Reda et al., 2018). Our findings agree with the literature, as children from low-income families were less likely to receive dental care services than did children from high income families. Similar findings have been observed in other countries like Japan and Canada (Nishide et al., 2017; Ramraj et al., 2013). These data must be interpreted with caution because the findings are limited by the cross-sectional design of this study which does not support temporality or causality. Bearing in mind that the study sample was restricted to 9- to 12-year-old primary school children in Al-Madinah City, caution should be practiced in generalizing the results to the entire country. However, considering the cultural homogeneity and urbanity of the area, we expect our estimates to be relevant to the general child population in SA. Moreover, we used self-reported data and fathers and mother's occupations as a proximity for family, which this could introduce bias. And it is important to bear in mind the possible bias in these responses.

Our findings emphasize that the free access to dental care in SA does not guarantee the utilization of dental care by everyone who is in need thereof. This study has identified the predictors of the utilization of dental care services, which could help in formulating strategies that are specifically geared towards the population that is in need of dental care. Future studies are recommended to further examine the underlying barriers to the utilization of dental services by children, including the use of geographic analysis to assess distribution and accessibility of dental services (Alsharif et al., 2016). This information can be used to inform the enactment of policies and to develop appropriate and specific interventions to increase dental care utilization among children.

5. CONCLUSION

The main predictors of dental care utilization among 9- to 12-year-old schoolchildren in Al-Madinah, SA were family income, having caries, and experiencing dental pain. Dental pain was the most common factor for visiting the dentist.

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Author Contributions

A.A. was the principal investigator for this study, proposed the study design, reviewed the literature, analysed the data, interpreted the results, and wrote the manuscript draft. A.T.A., E.K. and M.T. revised and critically commented on the manuscript draft and approved the final draft of the manuscript.

Ethical Approval

The study was approved by the Taibah University Ethics Committee in Al-Madinah, SA (TUCDREC/20I 70305/Bakeer) and ethical clearance from the University of Western Australia Ethics Committee was attained (RA/4/20/5467).

Data availability statement

That data that support the findings of this study are available from Department of Preventive Dental Sciences at Taibah University Dental College and Hospital, Taibah University, Saudi Arabia, upon reasonable request.

Conflicts of interest

The authors declare that they have no conflict of interest.

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